

# Micro X-Ray Absorption Spectroscopy for Environmental Science at Beamline 10.3.2

## Microfocus Beamline 10.3.2

Beamline 10.3.2 provides capabilities for chemical speciation by micro X-ray absorption and for elemental mapping by X-ray microfluorescence on environmental and other samples.

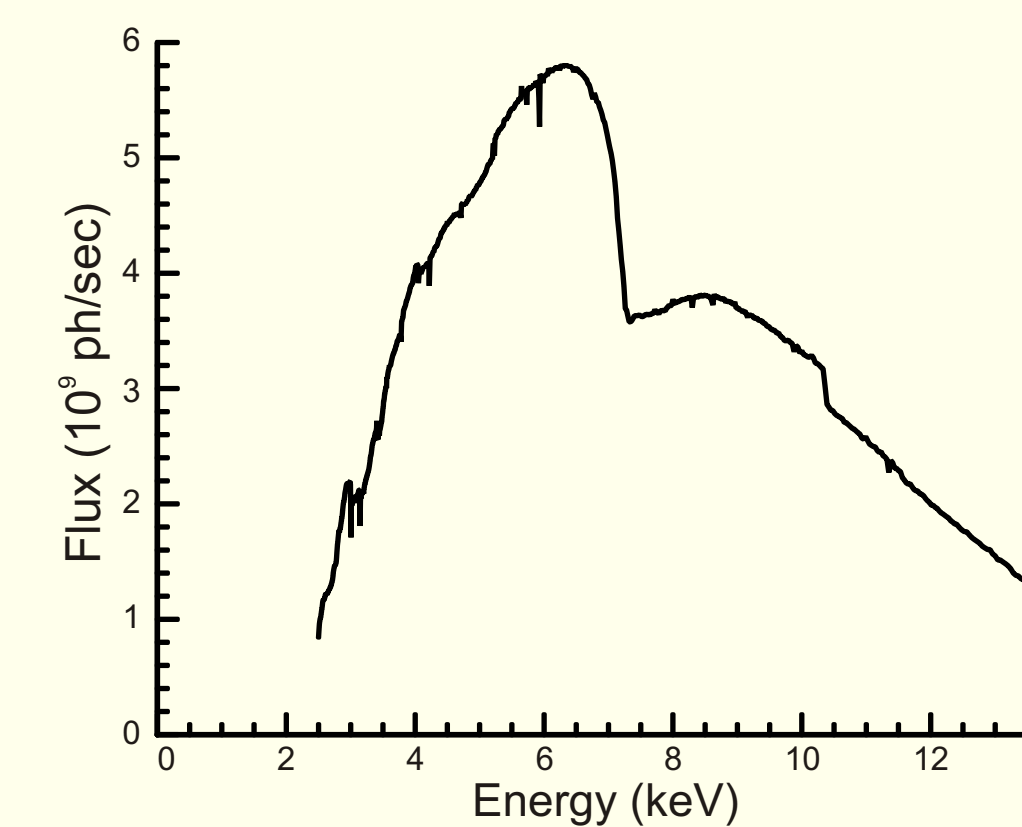
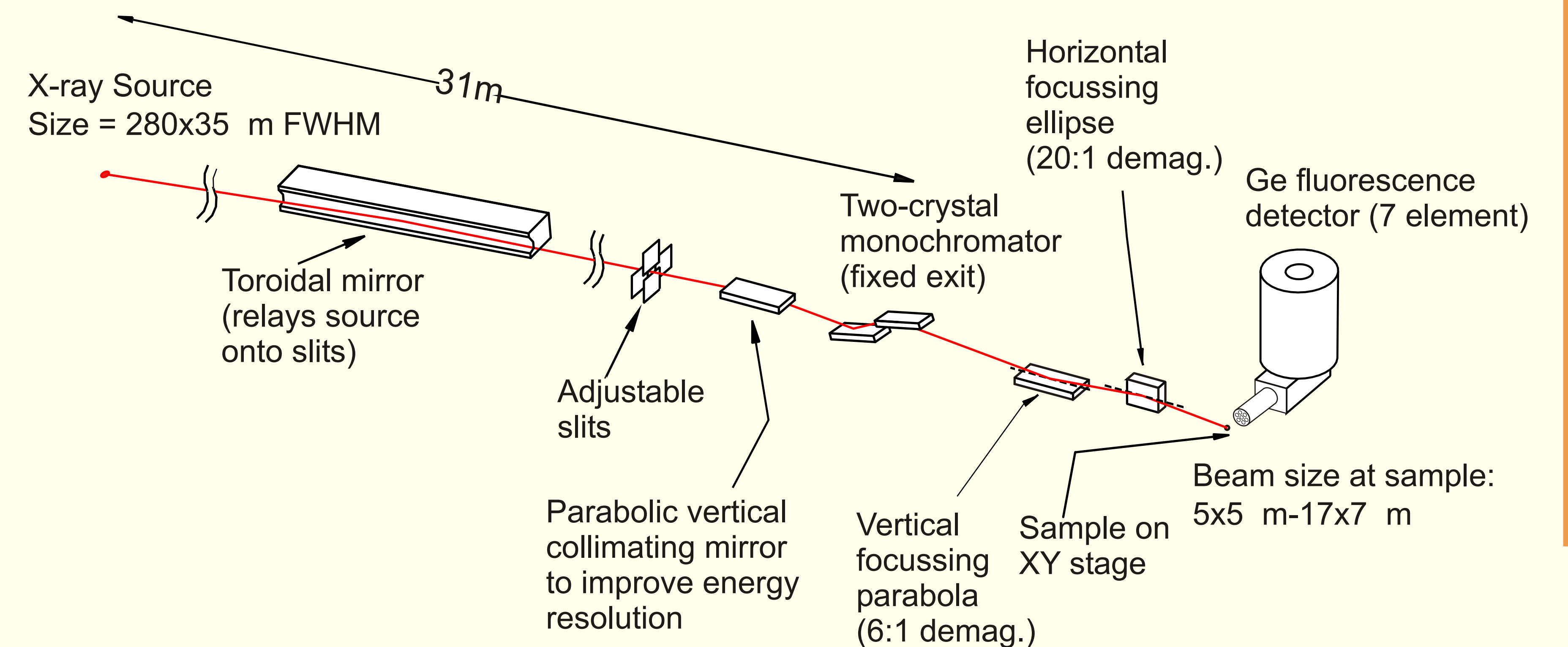
Core-level absorption makes experiments element-specific. Both extended X-ray absorption edge fine structure (EXAFS) and X-ray absorption near-edge structure (XANES) spectroscopies are possible. EXAFS provides quantitative determination of the local

geometric structure around the absorbing atom. NEXAFS spectra act like fingerprints which, by comparison with known standards, provide information about local chemistry, such as oxidation states.

The sample is mounted on a scanning stage which allows mapping of composition and oxidation state as a function of position. Interesting areas thus identified can be probed with EXAFS or powder X-ray diffraction for phase identification.

Focussing after the monochromator is by means of crossed mirrors in the Kirkpatrick-Baez configuration. The vertical mirror is bent to a parabolic shape and demagnifies 6:1. The horizontal mirror is bent to an ellipse and demagnifies 20:1. At full flux (see curve) the spot size is about 16x6 microns. It can be taken down to 5x5  $\mu\text{m}$  by closing down the slits defining the virtual source upstream of the monochromator.

The sample is moved under the beam by an XY scanning stage with 10nm resolution. A typical 5mmx5mm map with 20  $\mu\text{m}$  pixels can be scanned in about an hour.



Flux (photons/sec.) from the beamline at full spot size as a function of energy.